THE MAC Flyer

January, 1987

Flyin' the Line . . . Page 8

THE MAC Flyer

For Greater Safety in MAC Air Operations

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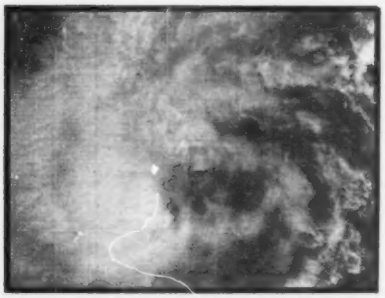

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A Cure . . . For what ails you.

Do you suffer from post-nasal drip, sinus attacks, chills, fever, aches, pains, and other symptoms of the mid-winter blahs? Don't you wish you could find a sure-fire cure for all those hiemal ailments? Well, search no further. We, the highly qualified pseudo-medicos on the TMF staff, have found the panacea for all your ills. All you need do is dust off your old Smythe-Korona, crank in a piece of paper and start typing your entry for the 1987 MAC Flight Safety Writing Contest. We guarantee your head will clear, your sinuses will stop dripping, and your aches, pains, and fever will disappear. Just submit your entry in accordance with THE RULES listed below and enjoy your newfound health and well-being. (This treatment approved and recommended by NASQ&C, the North American Society of Quackery & Charlatanry.)

THE RULES

The 1987 MAC Flight Safety Writing Contest is conducted according to MACR 900-3 and these rules. All entries must be original, unpublished and postmarked no later than 31 March 1987. Stories must be between 1,000 and 3,000 words long (about 6 to 14 double-spaced typed pages). Poetry should be about 75 to 100 lines. Entries must contain an *aviation safety/mishap prevention message.* Manuscripts must be double-spaced, typed and submitted in two copies. Identify entries by title only and attach a cover sheet showing the author's name, address, duty phone number and unit. The cover sheet must contain a brief autobiography.

The contest is open to anyone. Entries qualifiying under the above rules earn their author a free one-year subscription to *The MAC Flyer.* However, contest prizes (desk sets and plaques) may only be awarded to military members and civilian employees of the Department of the Air Force or Air Reserve Forces. Other entrants may be selected for Honorable Mention in a special category. All winning stories will be published in *The MAC Flyer.* Entries should be addressed to:

Flight Safety Writing Contest
HQ MAC/IGFE
SCOTT AFB, IL 62225-5101

Asleep in the Eye of a Typhoon

"It's been said that crewmembers can fall asleep anywhere."

by Maj. James C. Orr
HQ MAC/TRK
Scott AFB, Illinois

It's been said that crewmembers can fall asleep anywhere. I proved that theory one dark night over the western Pacific Ocean as a "Typhoon Chaser" with the 54th Weather Reconnaissance Squadron–the result was nearly disastrous.

Our mission, in the summer of 1980, was typical of storm reconnaissance missions flown by MAC every year in the lower latitudes of both the Pacific and Atlantic Oceans. We were to penetrate the eye of one of nature's most powerful forces—a typhoon—and collect meteorological data used for forecasting the typhoon's intensity, direction, and rate of movement.

MAC's WC-130 aircraft penetrate these storms at 6-to12-hour intervals, providing both day and night weather reconnaissance for the National Hurricane Center and the Joint Typhoon Warning Center. My crew, staging out of Clark AB, Philippines, was on standby to back up another crew flying the night penetration of Typhoon Kim. We were the primary crew for the next daytime penetration. We had already flown two missions in the previous 48 hours, both in excess of 12 hours duration, and wanted a long night's rest prior to the next morning's alert. I only had a few hours sleep in the past day and a half. I considered trying to sleep during the day, in the event we should be alerted at night, but figured the odds of having to fly as backup were slim. I also wanted to get back to a normal sleep pattern. So instead of resting, I took the typical shopping tour outside Friendship Gate looking for baskets, shells, and capiz lamps.

At 2000 hours that night, I called the Weather Reconnaissance Task Flight Coordinator to check on the progress of the night mission's primary crew, for which we were backup. They were airborne and expected to reach the eye of Typhoon Kim within two hours. That was good news to me, as I anticipated some heavy sleep and a 0730 alert. I dozed off about 2100, with lingering thoughts of how long Kim would maintain her typhoon strength. I was sleeping soundly when I suddenly heard the C-130 emergency alarm bell. The alarm repeated itself and I realized it was actually the telephone ringing. On my way to the phone I squinted at the clock's red numbers: 10:13 PM. The cool floor under my feet woke me enough to realize this was either a wrong number or an alert from Command Post. With mixed emotions I heard the controller tell me the primary crew was returning to base due to a propeller RPM fluctuation, and my crew had an ASAP launch, with bus pickup in 15 minutes. I was looking forward to flying—the best phone call a pilot can get is the go-ahead to launch—but I knew I needed more sleep to effectively command a

Honorable Mention 1986 MAC Flight Safety Writing Contest

crew on a long mission. I thanked the controller, then collected my thoughts and flying gear.

The balmy night breeze welcomed our crew as we waited for the bus outside Chambers Hall. I had taken time to shave and splash cold water on my face, hoping to appear alert. Time would tell, however, as my alertness waned during our briefing from the Task Force Coordinator.

Flight planning was already accomplished and our WC-130 was cocked. In a matter of minutes we were airborne. Takeoff time: 2308. Was it possible that only an hour ago I was drifting into a deep sleep? The other crewmembers appeared alert, although our intercom chatter was quieter than normal. I hoped they were more rested than I.

Climbout was uneventful as we headed east over the Philippine Sea. High altitude clouds blocked out the moonlight above and prevented reflections off the ocean below, enclosing us in darkness. Leveling off at FL 180, we soon entered moderate turbulence from a thick cloud deck. The bumpiness served as a tickler to the severe weather ahead.

Cockpit duties increased as we descended to 10,000 feet and entered the outer fringes of the typhoon. The navigator had three major tasks: ensure that we were heading directly toward the eye; assist the pilots in avoiding major cells; and plot our geographic location. The Aerial Reconnaissance Weather Officer (ARWO) took weather observations every 30 miles that included flight level temperatures, dew point, and intensity and direction of the winds. The dropsonde operator preflighted his dropsondes, testing their capability to collect temperature, relative humidity, and barometric pressure once they were released from the aircraft; and the flight engineer closely scanned the engine instruments and fuel distribution. The copilot and I were busy making continuous heading changes based on the navigator's inputs and our interpretation of the APN-59 weather radar.

An hour and a half after takeoff we were 400 miles east of Clark and an estimated 100 miles from the eye. The counterclockwise winds were already exceeding 60 knots. If the intensity of the winds was any indication, this would be a rough penetration. Signs of drowsiness disappeared as the crew prepared for the events ahead.

The frequency of heading changes increased as we maneuvered to avoid significant buildups. A typhoon or hurricane resembles a rotating octopus, with its many arms representing a series of cells. Our objective was to reach the eye by flying between these outstretched "tentacles." This task was particularly difficult at night, when outside references gave us no clue as to the best route. Thunderstorm avoidance was completely dependent upon radar.

The total darkness we had experienced for the last hour took on a new dimension as the turbulence increased. Without warning, pockets of up and down drafts would shake our aircraft—sometimes lasting only an instant, and other times continuing for what seemed an eternity. It was as if nature was playing a game with us, to see if we could guess when the next explosion of air would jar our airplane. Darkness created the illusion the aircraft was stationary with intermittent bombardments of invisible turbulence. There was no visual reference of movement through or around the clouds.

Forty miles from the eye, the winds reached 100 knots. The crew prepared to enter the wall cloud, a band of intense cumulonimbus clouds encircling the eye. All six crewmembers made sure their seatbelts were firmly secured and loose articles stowed. The copilot and I locked our shoulder harnesses. It's not uncommon during a wall cloud penetration for a 25-lb publication kit to rise a half foot off the floor or for an unsecured cup of coffee to travel horizontally across the cockpit.

The unmistakable sound of rain battering the aircraft with a 200 knot force announced we'd hit the wall cloud. The only noise louder than that caused by these torrential rains was created by the surging turboprops biting into the variable mass of air. The four propellers struggled to maintain synchronization as the aircraft lurched vertically and horizontally through the severe turbulence. The airspeed indicator danced between 160 and 200 knots and was occasionally unreadable due to the vibrations.

Cockpit workloads reached maximum. I fought the controls while the copilot maneuvered the throttles. The navigator crosschecked his Doppler and APN-59 radar and the ARWO struggled to collect and record meteorological data. The winds reached 130 knots, with gusts up to 160, classifying Kim as a Super Typhoon. Our alertness was at its peak.

The navigator gave another heading correction when we suddenly burst through the wall cloud into the eye. The turbulence ceased. The din of pounding rain abruptly stopped, and the crew silently celebrated—we had reached our objective.

Daytime penetrations into the eye are awesome sights. A cylinder of clouds surrounds the aircraft rising 30 thousand to 40 thousand feet; blinding sunlight fills the cockpit after emerging from the dark clouds; and blue sky and a calm blue ocean contrast with the violent swirling clouds. But nighttime penetrations create a different aura. Peacefulness permeates the aircraft because of the cessation of turbulence. Visibility varies depending on the moon's position in the sky. Tonight, the previously invisible clouds gave only a faint light, barely alluding to their destructive nature.

I established the autopilot in a 30° bank. This clockwise movement was opposite the movement of the surrounding wall cloud, and the proper angle of bank would keep us inside the eye's eight-mile diameter. The copilot left his seat for relief from several cups of coffee, and the flight engineer and I settled in for a relaxing tour of the eye. Meanwhile, the navigator, ARWO, and dropsonde operator worked tirelessly to determine our position and collect vital data on the typhoon. The dropsonde operator released a dropsonde to collect a vertical sounding of the atmosphere. Our on-board computer processed the information, and soon the ARWO was on the HF radio to Guam's Joint Typhoon Warning Center.

I turned down the volume on my HF radio and rechecked the autopilot's angle of bank, knowing that a constant bank of 30° would keep us in the eye

for at least three complete circles, without an adjustment. I reclined my seat to a relaxed position. A break was long overdue. I focused my eyes on a few stars overhead and wondered in amazement at the creation of the heavens and the earth. Suddenly, I was very tired. Seventy-four hours earlier I had quietly left my house on Guam in the middle of the night, and headed to the squadron. But I couldn't fool my body for long—it was off its sleep schedule when I left and had yet to recover. A little rest would be very nice. Just a little bit of sleep . . . sleep . . . .

I shook off the drowsiness and looked around. The other crewmembers were continuing their intense work. There was more chatter from the ARWO as he passed data over the radio. Again I checked the autopilot; our turn radius was keeping us well inside the eye, away from the furious wall cloud.

I settled back in my seat again, relaxed my head against the headrest, and stared outside. I could scarcely make out the outline of the wall cloud. Its invisible winds were traveling almost as fast as we were, but in the opposite direction. Inside the cockpit we were getting warmer due to the immense heat surrounding the eye. The wall cloud releases enough condensation heat energy in one day to equal four hundred, 20-megaton bombs, and the ambient air in the eye increases by ten or more degrees. The increased cockpit temperature decreased my ability to stay awake. My eyes started to close, and I began dozing off. I opened my eyes again. I knew I mustn't sleep. I sat up and positioned my seat to the full upright position. I would take a short catnap if the copilot would come up, I thought.

I looked at the chart plotting Kim's position, wondering where she could be heading. If she hit the Philippines we would leave Clark and stage out of Kadena Air Base. But Chambers Hall at Clark was comfortable, and I still had the key to my room. It would be nice to lay down and sleep. I would stretch out on my bed and sleep . . . sleep for two days . . . .

Suddenly a violent rotating motion to the *left* pulled my head and shoulder to the right. The aircraft shook tremendously and the pounding rain returned. Voices yelled at me. Where was I? I sat up and grabbed the yoke and stared at the attitude indicator. We were in a 75° *left* bank, descending. Unusual attitude. Roll toward the nearest horizon. Airspeed is increasing. Reduce throttle. Raise nose while rolling. The pounding and vibrating continued. The navigator was shouting, "Turn right 90°. Get back in the eye." The flight engineer was leaning as far forward in his seat as possible in a futile effort to help me. The propellers were throbbing again and the driving rain beat on the aircraft. The navigator continued searching for the eye on radar. Then just as suddenly as the turbulence started, it stopped. We were back in the eye.

The copilot made it back up the stairs and into his seat. Safely in the eye, we assessed what had happened. I had fallen asleep. The autopilot kept us in a level 30° turn and would have kept us in the eye indefinitely. But the eye moved, along with the typhoon, at the rate of about 12 knots. The result was an eventual collision. Our left wingtip caught the swirling wall cloud coming from the opposite direction with an approximate 400-knot differential, pulling us into the wall cloud. The autopilot unlocked, our aircraft rolled more than 100° and the nose dropped, much like a wingover maneuver.

Fortunately, there was no damage and no one was hurt. The dropsonde operator, standing near his equipment, and the copilot, working his way forward to the cockpit, fell over, but without injury. The only loss was my pride and my credibility as aircraft commander.

We continued our mission, staying awake and collecting critical information on Kim. She later became one of the most intense typhoons of 1980, slamming into the east coast of Luzon, killing 15 and displacing 167,000 residents. Torrential rains caused massive flooding over Luzon, as far south as Manila.

After returning to Guam, I discussed my experience with other crewmembers and found that drowsiness was a common concern, especially during night missions. I heard stories of sleeping crews overflying their destinations or falling asleep in a holding pattern prior to an approach. One former ATC instructor told me he had fallen asleep while his student was flying a steep turn waiting for instructions to roll out. In all instances, the cause of falling asleep in flight was poor planning—premission crew rest wasn't adequate.

Typhoon Kim taught me two lessons: plan ahead and be prepared for the unexpected alert. I was tired even before deploying to the Philippines from home station. Additional duties, office work, personal business, and last minute packing put me behind from the start. Proper planning would have given me that initial rest necessary for flying several missions on consecutive days. Secondly, I should have been better rested prior to entering standby status as the backup crew. I knew I was tired and could have slept during the day, but I gambled on not being alerted early—and lost.

For me, Kim became a reminder to get adequate rest before each mission. I plan my premission activities with more forethought and give more consideration to alert time windows. Now I keep both eyes open while flying, especially in the calm before the storm.

Major Orr graduated from the AF Academy in 1974. Following UPT he remained in ATC as a T-37 instructor pilot. As a WC-130 pilot with the 54 WRS, he penetrated the eye of 32 typhoons. After an assignment to Little Rock AFB, Arkansas, he attended the AFIT School of Systems and Logistics at Wright-Patterson AFB, Ohio, graduating in 1983. He is presently Chief of the Channel Requirements Division, Cargo and Requirements Directorate, DCS/Air Transportation, Scott AFB, Illinois.

Excellence In Airmanship

Left to right: TSgt. Pablo A. Publico III, TSgt. John G. Jilek, MSgt. Arthur Vogt, TSgt Rodney E. Williams, Sgt. Steven W. Rucker, Capt. Reed F. Hanson, Maj. Gerald L. Brown, Maj. Gordon L. Minner. Not in photo: TSgt. Charles M. Longenberger, Sgt. George H. Harman, Sgt. Daniel L. Nelson.

Maj. Gordon L. Minner and crew, 436 MAW, Dover AFB, DE., displayed outstanding airmanship during a mission on 15 August 86 when the nose gear on their C-5A malfunctioned. The C-5A Major Minner and crew were flying was scheduled for a static display at an airshow. During gear retraction after takeoff, the crew heard a loud noise. Checking their gear indicators, they noticed the nose gear indicator showed in-transit. Visual inspection revealed the nose gear doors were partially open. Major Minner decided to enter holding at the departure base as there was a possibility the gear might not extend. Using the C-5's MADAR (Malfunction Detection, Analysis and Recording System), the crew attempted to troubleshoot the system.

While accomplishing the procedures suggested in the Dash One and technical manuals onboard, Major Minner requested a Conference Skyhook to get more technical expertise. Technical experts recommended several procedures to lower the nose gear. None were successful. As it became obvious the nose gear would not extend, Major Minner directed the crew to review the "Wheels Up/Crash Landing and Landing with Nose Gear Retracted" checklists and begin preparations for landing.

Throughout the flight, loadmasters in the troop compartment kept the passengers calm, comfortable, and informed of the situation. The aft flight deck loadmasters secured all loose items and insured all seats were in a rear-facing configuration. They computed the effect of moving cargo to improve the center of gravity (CG) for landing, but abandoned the idea when they determined it would only make a 1% change.

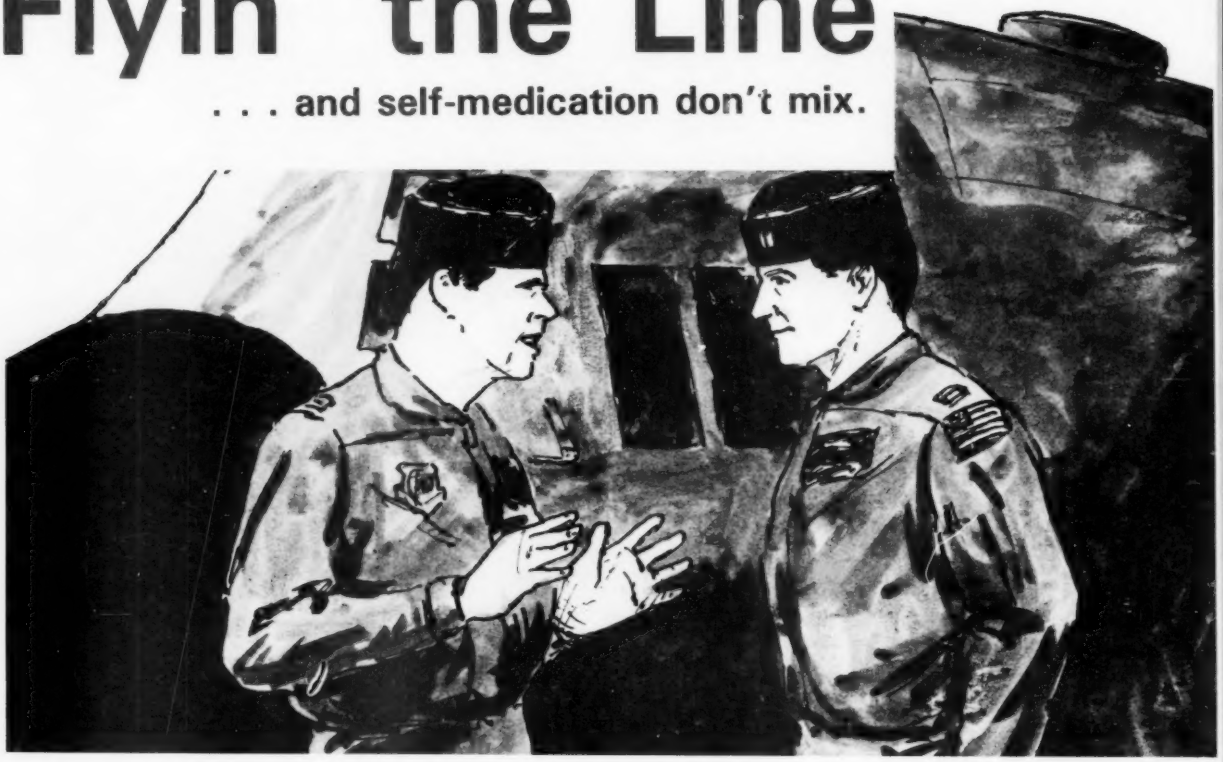
A low fuel condition became a critical problem as another attempt to lower the nose gear failed. Major Minner requested runway foam per the Dash One. He made one last unsuccessful attempt to lower the nose gear as he flew a low approach and pulled up into a closed pattern for landing. Loadmasters opened required emergency exits and prepared the passengers for landing.

The landing was normal through main landing gear touchdown, approximately 1,500 feet beyond the approach end. Major Minner used full aft elevator and nose up trim to keep the nose gear off the runway to 65 knots. At that time, he began to lose elevator effectiveness and smoothly lowered the nose. The aircraft slid approximately 1,500 feet before coming to a stop. Passengers and crew evacuated without injury as the fire department sprayed foam on the nose wheel area as a precaution. Damage to the aircraft was minimal.

Thanks to the leadership of Major Minner and the professionalism and superb technical expertise of the rest of the crew, a valuable resource was recovered safely, preventing injury to personnel. The *TMF* staff extends its congratulations for a job very well done.

Flyin' the Line

. . . and self-medication don't mix.



The thought of being back in the "real" world of MAC flight operations enthused Mac MacKenzie. For the first time since his assignment to Numbered Air Force flight safety office, he was getting an opportunity to do nothing for an entire month other than "fly the line" in the Pacific. Making this opportunity "happen," so to speak, initially appeared difficult. But when the NAF Chief of Flight Safety offered Mac's services to a Pacific Theater squadron commander whose C-130 pilot force had recently been hit with several extended DNIFs, things began to work in Mac's favor. Capt. Laura Langford, the newest addition to the office, offered to cover Mac's administrative duties, freeing him for the trip. Mac had already received theater indoctrination training during a previous TDY. All-in-all, things couldn't have worked out better.

This trip provided a two-fold benefit. First, it allowed Mac an opportunity to observe Pacific missions first hand—not as an observer or evaluator, but as an active participant. Second, Mac would get a chance to brush-up on some flying skills which had tarnished somewhat; a casualty of his staff assignment.

The deadhead flight was long, boring, and noisy—nothing unusual for transpacific flights. When the C-141 finally taxied to parking at destination, Mac realized he was *tired*. As he boarded the crew bus to base operations, Mac's thoughts turned to how great he was going to feel after a hot shower and a good night's sleep—even if it *was* the middle of the day.

After a quick stop at base operations and command post, the crew bus shuttled the weary crew to billeting. Mac gathered his gear and stepped off the bus into the crisp air characteristic of Japan in winter. Before he could reach the billeting office door, an unmistakable voice cut through the coolness of the afternoon.

"Hey MacKenzie!"

That voice could only belong to *one* person—Capt. Clinton R. Terzowski. Mac's thoughts dashed back to his days at pilot training. He remembered how Clint almost washed out of the program because he spent too much time *enjoying* himself, and too little time *applying* himself. Mac also remembered how Terzowski loved a good practical joke. He would *never* forget the time Clint booby-trapped Mac's room with firecrackers.

"Clint Terzowski! I haven't seen you since pilot training," intoned Mac with as much feigned enthusiasm as he could muster. "What are you doing here?"

"Well, Mac, aside from being the scheduler *and* the hottest '130 pilot around, I'm also supposed to take care of you during your little stay here in the Pacific. I'll help you bag drag and

then we'll go see Lt. Col. Fontoon, the new squadron commander. He's anxious to meet you. By the way, here's an information package. Inside you'll find all sorts of base info—you know, O'Club calendar, base map—that sort of thing. Oh yes, and I also included the weekly flying schedule. Hope you're ready to do some heavy duty flying."

"You know I am, Clint. That's why I'm here."

The trip to the squadron was filled with the ongoing clamor of Clint's "war stories" occasionally interrupted by his incessant sniffling and coughing. It dawned on Mac that Clint hadn't really changed much over the years—all airspeed and no rudder, as Mac's old squadron commander used to say. Clint seemed to constantly move at the speed of light but never paid much attention to detail. Also, he'd never fail to inform you about his most recent accomplishment—even if it took place a *long* time ago. Mac reasoned that Clint's biggest problem was he didn't know when to slow down.

"Clint, sounds like you have quite a cold. Is the flight surgeon's office pretty good here?"

"Well, Mac, I can't say as I can tell you for sure. You know me. I stay away from the doc's office at all costs—that is, unless there's something *really* wrong. Besides, I'm not like some of the other guys. You know, the kind that make the flight surgeon's office their home away from home. It's those kind of guys that *really* drive you batty—especially if you're the scheduler. Can't ever count on 'em."

Mac just smiled and shook his head. No, Clint hadn't changed at all.

"Good morning, MacKenzie. It's good to have you on board. I'm glad this trip of yours worked out as well as it did." Colonel Fontoon's manner was pleasant, as usual. "Is Terzowski taking care of you?"

"Yes sir, Colonel, and I appreciate your concern and hospitality. As a matter of fact, he's taken *such* good care of me I haven't had time to get settled in," Mac quipped.

"Well, he's like that, you know. Don't get me wrong, he's a fine AC, but sometimes he just doesn't know how to slow down. By the way, have you had a chance to glance at the flight schedule yet?"

"Not yet," Mac responded.

"Well, I'm sure you'll find yourself *very* busy, *very* soon. Look forward to seeing you out on the flight line. Now let's sit down. I want to explain what I expect of you, same as any of my pilots."

After his interview, Mac suffered through another seemingly endless harangue about the "good old days" as Clint drove him back to the "Q." Mac was relieved when the car came to a screeching halt in front of billeting and he was able to bid his old friend adieu. Mac checked in, got his key, and made his way toward his room, anxiously awaiting some much-needed sleep. However, before he retired, Mac took a few minutes to read the contents of the information packet he'd received earlier. Though he knew it really shouldn't matter, his enthusiasm waned somewhat when he looked at the schedule and discovered his first mission had him flying as copilot—for Captain Clint Terzowski!

0400 came early, Mac thought as he arrived at base operations. All the familiar sights, smells, and feelings of "flying the line" came rushing back.

"Nothing like a couple of good old walk-aways and some black coffee to get you moving in the morning," chimed Clint's now all-too-familiar voice.

"You look like you're feeling better," Mac replied.

"You bet, Mac. It's like I told you, there's nothing to shaking a head cold. You just have to treat the old bod' properly." Clint winked slyly. Mac didn't quite know what to make of the gesture.

Preflight planning was simple. This was to be a standard embassy run down into southeast Asia—no problem, just another typical air/land mission. The loadmasters had already loaded the cargo and the "dip clearances" were all taken care of. Weather en route was acceptable—nothing great, mind you—but acceptable, and Mac was anxious to get his first glimpse of Thailand. Clint seemed a bit nervous as he climbed into the left seat of the Hercules. Takeoff was normal, but Mac thought Clint was a little slow calling for checklists. Also, Clint was having difficulty hearing other crewmembers on interphone.

After level off, Mac moved his seat back and turned to Clint, who seemed to be staring blankly at the horizon.

"You okay, Clint?"

"Of course," responded Clint a little defensively. "I'm just scanning the horizon for traffic."

"Sure, no problem. Listen, I'd like to take a break for a couple of minutes. That cup of coffee I had this morning seemed to go right through me."

"Yeah, go ahead, Mac. I have the radios."

As Mac made his way down the ladder he began to wonder if it was such a good idea to leave Clint up there by himself. Normally, this question would never have entered Mac's mind, but this time things seemed different. On his way back up front, Mac paused to chat with one of the loadmasters, grabbed a cup of water, and climbed the stairs back into the cockpit. Approaching the right seat, Mac looked over and saw Clint's head droop as he slept soundly. It was obvious the flight engineer hadn't noticed his AC was asleep at the yoke.

"Clint!" Mac attempted *not* to embarrass the AC.

Clint bolted upright in his seat, hitting the yoke in the process. The Hercules jolted slightly.

"Pilot, loadmaster. Everything okay up there?"

"Yeah, load, everything is fine," Mac reassured. Secretly, Mac knew this wasn't true.

"What took you so long, Mac? A guy could die from boredom up here by himself." Clint's feeble attempt at a decent recovery from this situation wasn't successful.

"Clint, are you *sure* you feel all right?" Mac prodded.

"Well, to tell you the truth, I am a little bit tired. I guess I didn't sleep so well last night."

It was then that Mac glanced over and saw a package of head cold relief capsules protruding from the pocket of Clint's flight jacket. Mac couldn't believe his eyes. He wondered how many flight safety meetings Clint attended where he was warned about the hazards of self-medicating. Mac knew that he himself had recently sent a volume of material to all of his FSOs highlighting the problems associated with flying with a head cold and self-medication. *Everyone* should know that self-medication can cause drowsiness, loss of visual and aural acuity, and possible allergic reaction; not to mention the dangers of improper and uninformed self-diagnosis. Additionally, he got the distinct feeling from Colonel Fontoon that nothing like this would be tolerated in the squadron. Now Mac had a decision to make.

"Clint, I don't think you're well enough to continue this mission." Mac was astounded at Clint's reply.

"You know MacKenzie, you're right. I want you to take the controls and divert us back home. I'm having some *real* problems with my ears."

Perhaps Mac underestimated Clint. In the old days Clint would have tried to bluff his way through this situation. Mac had expected the full wrath of Clint's indignation. The thought of suffering the embarrassment and possible professional consequences of an air abort due to a physiological incident of this nature wouldn't have allowed Clint to relent. But things appeared different now.

"Do you have any sharp pain in your ears?"

"Not right now," Clint replied. "I'll let you know how they feel as we descend."

Mac took control of the situation. He contacted approach control to request a vector for the return flight and contacted command post to inform them of the situation. During descent, Clint's ears began to hurt.

"Sorry Mac, but I can't seem to clear my ears."

"No problem, Clint. We'll just take our time descending. When did you last take one of those cold pills?"

"About eight hours ago. It must be wearing off."

"The problem is, Clint, those cold remedies you're taking only temporarily address the *symptoms* of a cold. Unfortunately, they don't *cure* the cold and may create their own weakening side effects."

After a slow, gradual descent on final, the -130 touched lightly and Mac taxied the aircraft to parking. A flight surgeon entered the aircraft and quickly examined Clint's ears, nose, and throat.

"You were lucky, Captain," intoned the doctor. "You could have broken both eardrums and experienced some permanent hearing loss. Here." The flight surgeon handed him some nose spray which quickly cleared Clint's ear block.

"Welcome to the Pacific, Mac," grinned Clint. "Some of us take a little longer to learn our lessons."

Just then, both Clint and Mac spotted Colonel Fontoon approaching the aircraft.

"Well, time to pay the piper," Clint said dejectedly.

Mac knew that Clint Terzowski was a survivor. He just hoped Clint had learned enough from this episode to remain one.

Introducing . . .

Safety Workhorse—*The FSO*

by Lt. Col. Michael G. May
and
Capt. Donald L. Rosenberry

He strode confidently into the office. As he approached the meticulously clean desk, he couldn't help smiling at the nameplate crisply lettered with his rank, name, and the title FLIGHT SAFETY OFFICER. My first real desk job, he thought, guess I'm finally moving up. Then he spotted a lightbulb on the floor by the trash can. With considerable pleasure, he stooped, picked up the bulb and unerringly determined it was on at failure. Ah yes, he daydreamed, for the first time in my career, I'm thoroughly trained for the job *before* I start it. I'm prepared for the worst.

"Welcome back, Jack." The commander walked briskly into the office, accompanied by the office secretary. "I'm glad you got the school under your belt, because we need your expertise. I've asked Charlie here to grab the after-action report on the staff assistance visit NAF gave us while you were away. They gave us a thorough review, just as I asked, and found some 68 areas we could really work on. Since the ORI/UEI is just around the corner, in fact it could be as early as next month, I need you to really get cracking on this program. You've got my full support."

"No sweat, sir. I'll get right on it."

He grabbed the voluminous program review and started reading. Uh oh, he mused, I'm going to have to brush up a little. I don't see anything here about formal reports, witness interviews, and the like. Why, it's almost purely staff stuff. The first three pages are all nits about mishap reports, for crying out loud . . . !

If this sounds even vaguely familiar to you, this article, and others like it to follow, are for you. Starting with this issue, we will be taking a good look at the *nuts and bolts* of a good flight safety program. The *goal*, of course, is to lend some insight to the not always self-explanatory guidance the 127 series regulations provide. We aren't going to try to put an iron clad set of procedures down in print. There are as many good ways of approaching each

area in safety as there are good people addressing the discipline. Besides, have you ever tried to write a rule that would *always* apply to *everything*? The effort is not unlike trying to unlock the mystery of why disco dancers snap their fingers. However, there are techniques that will ensure your successful investigation of a hazard report (HR), mishap, or hazardous air traffic report (HATR). Some of these techniques require some thinking (we talked about this and decided to go ahead with it anyway). Actually they are a collection of insights, some gained painfully ourselves, and some from looking long and hard at the work others have done in their programs.

Our interest is in *preventing* mishaps. We believe your effectiveness directly contributes to the health and well-being of our aircrews and the success of MAC as "The Backbone of Deterrence." That phrase ought to illicit some great thoughts and feelings. The point is—*you* are extremely important in the grand scheme of MAC. We want to expose you to ideas that will increase your flexibility and success in fulfilling the arduous responsibilities of a MAC flight safety officer. If you're not a flight safety officer, our aim is to enlighten you on some of the responsibilities your "buddy" is tackling day-to-day, and give you a better idea what flight safety is all about. So we probably ought to define the entity of which we speak so frequently—*what do we mean by flight safety?*

Flight safety has no clear, easily defined boundaries. Anything that can impact the safety of flight is fair game. This necessarily includes what flyers do when they *aren't* flying. Therefore, as a flight safety officer, you have quite a task. So if you haven't already discovered it, you'll find this job is never done—it's an open-end job. Once you realize this, you'll be able to set your priorities. Unless you set these priorities, and follow them, you'll spend as much time looking for end-run options around the perceived insurmountable requirements as you will addressing problems. Your objective *must* be to make the most of your time—be efficient. Find out those things which are most important (different for every commander in the specifics), find out how best to get them done (techniques), and do them. Good advice, eh? Well, we know that telling you to "identify the problem, find the solution, and fix the problem!" isn't exactly a tremendous help, so we plan to expand on the concept. We intend to provide a product that will help you achieve this goal.

If we are successful with this series of articles, there won't be any surprises left about the major areas of flight safety that you haven't seen from close up—through the microscope.

As with any lead-in article for a series, we have the requisite philosophy you've been expecting. As we mentioned earlier, we ascribe to the view that *you* make a big difference in the success or failure of the commander's safety program. Your commander entrusted the care and feeding of the program to you and, except for your tutelage on ways he can more *visibly* promote safety, we will work on the assumption your commander does give his full support. We'll concentrate on ways *you* can best go about running an effective program. We could start almost anywhere, but since this is a series of *well-planned* articles, we've come up with a tremendously useful sequence (see Figure 1).

To get us off on the right foot as far as background conceptsof safety in general, we'll initially address hazard reports—their investigation and processing. The mishap report, with its wide area of coverage, should launch us in the right direction. Once we've handled that difficult area, we'll turn our attention to HATRs and the investigative sequences necessary there. Next, we'll take a look at mishap reports, MAC style, and try to iron out some clear guidelines we can all live with, while making the report what it is—an excellent training device and corrective action tool.

Then we'll turn our attention to some of the "other" areas which will undoubtedly surprise Jack, and may have surprised you, as areas of responsibility the flight safety folks really need to improve. We'll start with the elusively straightforward nuclear surety and explosives safety fields so important and often ignored (unless you're PNAF). You, as the FSO, need to be aware of these two disciplines, they're integral to MAC flight operations. Besides, you may be "The Safety Expert" in the field when the commander needs some answers about QD or AIDs (no, not the biological kind). After looking at these hefty programs, we'll highlight the BASH program, and the seemingly unending meeting requirements near and dear to every flight safety staff member. Right after this, we're headed for more "frontline" safety.

Contingency safety training and safety guide books will be our next topic, followed by the ever-present high-hazard inspection. We'll then feature a much neglected area of flight safety which really deserves much greater attention—aero clubs.

The next issue is a theme. We'll discuss the values and ideas both practical and philosophical, of keeping ground and flight safety in careful juxtaposition (that is—like the song,"Side-By-Side)".

November's topic may well be one of the most important of all, for we'll address some of the methodology and rationale behind effective flight safety meetings. That'll bring us to the wrap-up article in December. We'll touch on any areas of change, rehash some of the topics, and this is the issue *you'll* be featured in. We want to encourage you to respond to, question, challenge, and otherwise intelligently discuss (don't worry about us, we'll get a translator) the series as you perceive it. But don't think you have to wait until December to write. As soon as the idea hits you, fire us a line. If you'd rather not see the letter in print in the final issue, just tell us. We'll address questions, concepts, and problem areas of a general nature you raise in this final edition. We want this to be an effective tool, and *that* requires two-way communication. Big point: we need your contributions; it'll be mutually beneficial. Here's your opportunity to pin us to the wall. If you want an answer—ask the question. We'll either find the answer for you, or generate a policy if there's a need to fill a gap. We need this type communication to provide a useful guide you can use in improving your job performance, and ultimately in improving safety. We want to help you and your unit get in front of the ball, instead of being dragged flailing behind it. See you next month!

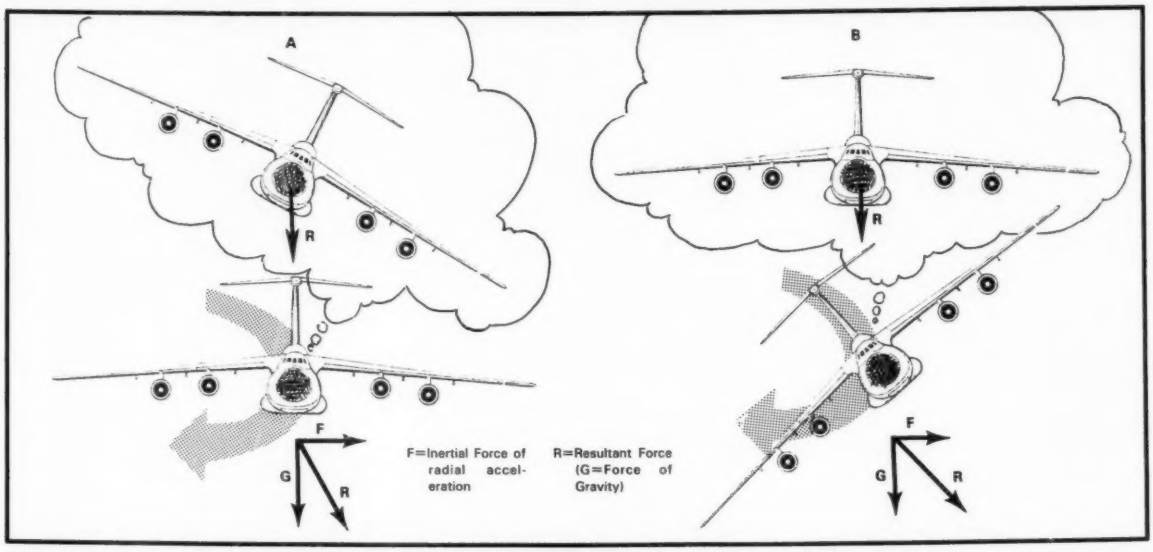
EDITION	TOPIC
JAN	OVERVIEW/SAFETY PHILOSOPHY
FEB	HAZARD REPORT INVESTIGATION
MAR	HATR INVESTIGATION
APR	MISHAP REPORT INVESTIGATION
MAY	NUCLEAR SURETY AND EXPLOSIVES
JUN	BASH/MEETINGS (ATC, FOD, etc.)
JUL	CONTINGENCY SAFETY TRNG/GUIDE BOOKS
AUG	HIGH HAZARD AND OTHER INSPECTIONS
SEP	AERO CLUBS
OCT	FLIGHT AND GROUND: TOTAL SAFETY
NOV	FLIGHT SAFETY MEETINGS
DEC	WRAP-UP/FEEDBACK/READER COMMENTS

Lt. Col. Michael G. May is Chief, Flight Safety Division, Directorate of Safety, Office of the Inspector General. It wasn't always this way though. He began his career in 1969 with graduation from the US Air Force Academy. He promptly entered UPT, not to emerge until 1970 as a pilot. His rather normal rated career includes C-141s with the 4 MAS at McChord AFB, WA; a stint as Instructor Combat Crew Commander at 68 SMS Ellsworth AFB, SD; C-5s with the 3 MAS at Dover AFB, DE; and Command Post at Anderson AFB, Guam. He then began his early qualifying for co-writing this series of articles, first as a flight safety officer while flying C-5s, again at Dover. He moved from there to round two of his qualification program, stepping into the Chief of the Safety Branch, Operations Inspection Division for the Inspector General here at HQ MAC. His final transition to qualified co-author came as he moved to his current position as Chief of the Flight Safety Division.

Capt. Donald L. Rosenberry has, first of all, a much shorter resume than Colonel May. He too graduated from a small midwestern university nestled at the base of the Rocky Mountains, but in a different decade, barely graduating in 1978. After an amusing few months at UNT, Captain Rosenberry emerged somewhat scathed, but a fully-qualifed navigator nonetheless. Then he transitted upgrade training at Little Rock, Arkansas, for the technical skills required of steely-eyed C-130 navigators. Then off to operational flying in the far east with the 345th TAS, Yokota AB, JA. After a couple years, and an upgrade to instrutor, he was reassigned to the 316 TAG, also at Yokota as the Group flight safety officer. His final qualification to co-author this series is debatable—he's a *TMF* associate editor.

WHICH WAY IS

Somatogravic Somersaults



False perception of attitude—the somatogravic illusion—in a turn. The aviator equates the sustained resultant (R) with the vertical. Hence, in a flat turn (A) he may feel as if he were being rolled out of the turn. In a coordinated turn (B) the resultant is aligned with his Z axis and he has no sensation of being in a banked attitude.

by CDR V. M. Voge, MC
Naval Safety Center

Somatogravic illusions are those in which we perceive our aircraft is in an attitude which actually is the resultant of various force vectors that may be in a direction and/or of a magnitude different from the normal gravitational force. Sound confusing? We'll try to clear it up for you. This illusion has already killed too many aviators, and there is no guarantee that its effect won't strike another unsuspecting crew in the near future. But no need to get an anxiety attack, this one is not dangerous, *if* you're aware of its insidious nature and take corrective actions. Interested? You should be!

We normally consider gravity a "stable" point of reference— something we can depend on. We're used to it, and we accept it for what we *think* it is. We regard it as a vertical force (at least most of us do). As you may or may not remember from your basic physics classes, gravity is actually a force of acceleration perpendicular to the earth's surface. This is essentially the same physical principle we experience when we have a linear or translational acceleration. Usually, linear acceleration curves are short lived—e.g. you have to stop at the next stop light. When this is the case, our "infallible" brain can separate these added acceleration forces for what they are, and there is no problem.

The problems come when we have prolonged acceleration curves, or profiles—as when we take off in our trusty aircraft—especially at night or in IMC. These profiles are usually obtained through an increase in thrust or a decrease in drag. The acceleration input separating mechanism in our brain gets short circuited, and the various acceleration

DOWN?

inputs are combined. The resulting apparent centripetal force is our *new* vertical point of reference (our force of gravity). This is yet another reason "seat of the pants" flying is so dangerous to the unwary.

Even our basic maneuvers texts way back in preflight gave us a hint of this illusion when they talked about load forces on the aircraft and load factors in coordinated and uncoordinated turns. In a prolonged, coordinated turn, we feel as if we're not even turning. Because the gravitational force equals the centrifugal force, we have a net force change of zero. In a prolonged uncoordinated turn, the centrifugal force usually exceeds the gravitational force, and we slide to the outside of the turn (or the inside, depending on whether we're in a slip or a skid, a banked or flat turn). Got the drift? (No pun intended.) If the turn is prolonged, our brain takes the resultant force vector of the gravitational and centrifugal forces and gives us a new vertical. The change in the perceived vertical is most dangerous in the pitch mode, especially during low-level flight.

In normal straight and level flight, without acceleration forces, the force of gravity is the predominant force and we have no problem. Our trusty "gluteus medius et maximus" faithfully tells us where Mother Earth is located. During a prolonged acceleration, created by increasing thrust or decreasing drag, a force pushes us back into our seats, and we feel as if we're pitching up. The resultant force is aft and down (our new vertical). The opposite occurs if we decelerate, as in power reduction or increased drag. (Have you ever double-checked your altimeter or VSI after putting out the spoilers to make sure you weren't losing altitude, or have you ever pulled the stick back to maintain altitude, only to discover you were climbing?)

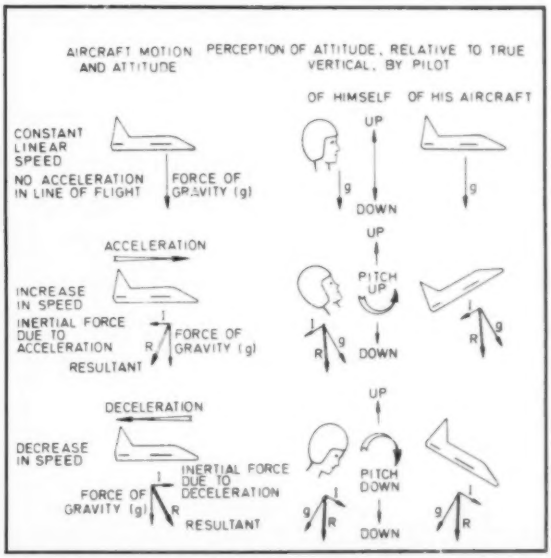
For those of you who prefer a definite mathematical relationship to confirm just how affected you'll be and when it willl happen— forget it. The magnitude of the effects vary with each of us as individuals, and the effects can take up to a minute to become fully established. The Navy experienced a problem with night-launched missions—the aircraft would fly into the water after a normal launch. The catapult launch, which yields a 5G (50 meter/sec^2) acceleration for 2-3 seconds, can give an erroneous sensation of a nose-up attitude for more than a minute! Since the cause of those "unexplained' mishaps was documented, general instructions for climbout after such a launch were modified. They've lost very few planes since. Those they still lose are attributed to the pilot not looking at or believing his instruments! But this is not a phenomenon for high performance aircraft pilots only.

As little as 0.2G, if sustained for several minutes, can make you feel like you're climbing. Worse, it can make you feel like you're in level flight while you're actually losing altitude rapidly. These magnitudes affect everything that flies, even helicopters.

If you experience somatogravic illusions on takeoff, or when you're worried about overshooting an approach (especially so at night or under poor visibility conditions), you may feel as if you're climbing or in a pitch up attitude. Response? Push the stick forward, of course! No time to check altitude—too low! Get the picture? Things are usually worse if we decide to decelerate or accelerate during a banked turn. We now have two added accelerative forces, instead of the already dangerous one. The resultant force vector gives the seat of the pants pilot a perceived vertical that is even farther from the truth. We make what we feel to be a corrective response, but the nose-up attitude seems to become more severe, rather than becoming less. We're tempted to push the stick a little further forward. We may find ourselves exposed to negative Gs. Confused on the outcome? Well, those pilots who've been lucky enough (and high enough) to recover from their illusion have reported they felt as if the aircraft had pitched up and flipped over on its back. Recovery was finally made with the plane actually in a *near-vertical* dive, several thousand feet lower than when everything started!

As usual, we will tell you how to prevent making yourself a static display once you suffer this illusion. Scan your instruments repeatedly. Do not rely on what you *feel* to be your orientation or attitude. Double-check your instruments, and *believe* your instruments. There's always time enough to save your skin, if you only choose to do so.

Courtesy Approach



Somatogravic illusions during linear acceleration or deceleration in the line of flight errors in the perception of pitch attitude.

Dynamic Rollover . .

Means certain disaster.

by Capt. Michael J. Iltis
Associate Editor

1st Lt. Jim Lever was a highly-skilled and motivated UH-1 pilot. His "good hands" and superb knowledge of the books enabled him to upgrade to AC a little faster than his buddies in the detachment. Now he was being considered to fill a vacant instructor position. All in all, things looked good for Jim Lever.

It was this confidence that accompanied Jim the morning of 15 February as he prepared for another routine mission supporting a base contingency exercise. His job was simple—deliver a team of security police to a remote site in the mountains 30 miles west of the base and maybe get a couple of instrument approaches for currency on the way home. The interesting part of the mission would be his opportunity to perform for a television audience. A local television station was filming the whole operation at the remote site as part of a week-long video segment on the base's operational readiness.

His copilot had already plotted the LZ on the map, along with course lines, navigation/information blocks, and time-tick marks. The flight engineer had prepared takeoff and landing data and completed a new weight and balance form. All Jim had to do was prepare the flight plan, sign the flight authorization, and brief the crew. Everything was running like clockwork.

The flight to the LZ was routine and Jim's copilot was right on the money with navigation. A thorough reconnaissance of the site told Jim he'd have no problem on the approach, but he'd have to land on a rather steep, muddy slope. There were no surprises. Jim's flight engineer adeptly "talked" him into the site. Jim maneuvered the aircraft to land cross slope with the left skid in the upslope position. The touchdown was a little sporting, but nothing beyond Jim's ability.

Jim watched as the security police exited the aircraft. He spotted the television cameraman and was glad he'd touched down where he did because this position afforded the best camera view of the aircraft.

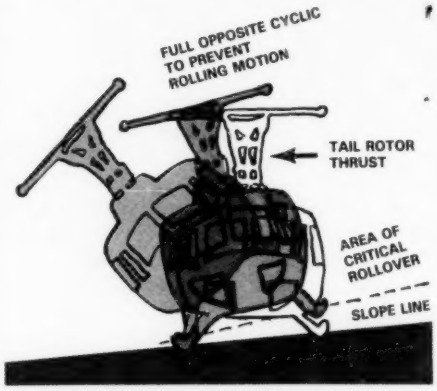
"Crew, this will be an altitude over airspeed takeoff from the ground." Jim's departure briefings were always to the point. "Takeoff heading will be to the north, about 350 degrees. There are no airspace restrictions and the tree line to the north is the only hazardous terrain we'll have to avoid. If we experience complete power loss of loss of tail rotor on departure, we'll set this thing down straight ahead, into the wind, avoiding the trees if possible. Engineer, is everything secure in the cabin?"

"Yes sir," responded the FE.

"Any comments about the departure, crew? If not, read me the Before Takeoff Checklist. Let's make this a good one 'cause it's for the six o'clock news."

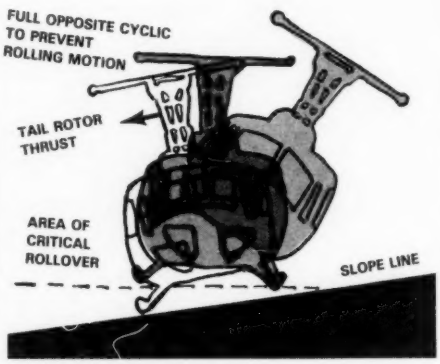
With all checklists complete, Jim increased collective for takeoff. Surprisingly, Jim felt the *upslope* skid break ground first. What followed was a blur of motion and noise accompanied by a sickening feeling in the pit of Jim's stomach telling him he was no longer in control of the situation.

The aircraft came to rest on its right side. Jim felt a tug at his stomach which turned out to be the copilot attempting to unfasten Jim's lap belt and shoulder harness. He turned his head to the left and was surprised to see the remains of what must have been the transmission, now ripped



DOWNSLOPE ROLLING MOTON

Downslope rolling motion is caused by excessive application of collective pitch in coordination with cyclic application into the slope. When the downslope skid is on the slope, excessive application of collective may result in the upslope skid rising sufficiently to exceed lateral cyclic limits, and induce a downslope rolling motion.



UPSLOPE ROLLING MOTION

Upslope rolling motion is caused by excessive application of cyclic into the slope, in coordination with collective pitch application. During landings or takeoffs, this condition results in the downslope skid rising sufficiently to exceed lateral cyclic control limits, and an upslope rolling motion occurs.

from its bulkhead and solidly lodged in the forward cabin area. The two steadily illuminated fire lights on the instrument panel jolted Jim back to reality.

Jim felt the jagged plastic edges of the upper greenhouse window bite into his face as he pulled himself through its small square frame. He ran clear of the smoking pile of rubble that, only moments before, had been an airworthy helicopter. His next thought seemed trite and misguided, given the scope of what he and his crew had just been through. He knew that if his landing didn't make the evening news, his takeoff certainly would . . . .

This mishap could have been prevented. What caused it was an aerodynamic phenomenon known as *Dynamic Rollover*. All helicopters are subject to this problem, but single main rotor aircraft are particularly vulnerable. So, before you learn about this phenomenon the hard way, take a few moments to look at this problem—what it is, what to do if you encounter it, and how to avoid it.

Generally speaking, there are three ingredients necessary for dynamic rollover. The helicopter's *critical roll angle* must be exceeded, a *roll rate* must be established, and a *pivot point* created.

Rollover angle and roll rate.

Every helicopter has a critical rollover angle which, if exceeded, will result in uncontrollable aircraft roll. The degree of this angle is different depending on the design of the helicopter. However, the important thing to remember is, they all have one; and if it is exceeded, the aircraft will roll!

Inertia, created by roll rate velocity, increases potential for exceeding critical roll angle. This inertia is critical because the greater the inertia, the less time available for corrective action. Simply stated, even though critical roll angle hasn't been exceeded, inertia, created by a rapid roll rate, may carry the aircraft over that point regardless of corrective control inputs. A crosswind in the direction of roll will also increase roll rate.

Pivot point.

A pivot point may be created in one of several ways. It may result from one wheel or skid becoming stuck in mud, frozen to the ground, or trapped under an object. Likewise, a pilot can induce a pivot point by using poor takeoff/landing technique. For example, a helicopter pilot executes a cross slope takeoff from a confined area. He applies cyclic control input in the direction of the slope, attempting to lift off in a level attitude. If a pilot applies *too* much cyclic "into" the slope, he/she creates a pivot point around the upslope skid or wheel. An aircraft with lateral center of gravity offset right or left can also create a pivot point.

Though this discussion has dealt primarily with upslope pivot points, keep in mind that a downslope wheel or skid can also become a pivot point. (If you recall, this was the case in Jim Lever's situation). Indeed, dynamic rollover can take place over flat terrain.

Corrective action.

As is the case with most problems, early recognition is the key to corrective action. This is particularly true of dynamic rollover because once critical roll angle is exceeded, there is virtually *nothing* a pilot can do to stop rollover. However, if a pilot recognizes the roll early enough, he can alleviate the situation. Reducing collective pitch is perhaps the *best* corrective action. Rapidly increasing collective doesn't work because it only serves to increase roll rate. Also, if the aircraft should break free of the ground before critical roll angle is exceeded, as a result of increasing collective, the ensuing opposite aircraft reaction may prove to have as disastrous an effect as initial rollover. Likewise, applying cyclic control in the direction opposite the roll usually won't create enough force to counter rollover inertia. There is one caution, however, associated with reducing collective— forcing the airborne skid or wheel back on the ground with such force that it causes structural damage, main rotor/fuselage contact, or an ensuing roll in the opposite direction.

Prevention.

As mentioned before, your chance of escaping unscathed from a rollover condition, once you exceed critical roll angle, is slight. Therefore, *preventing* dynamic rollover ought to be our primary concern. This may be accomplished if you apply a few simple rules of thumb:

- Make sure collective and cyclic inputs are smooth and deliberate. Abrupt control movements increase roll rate, decrease critical roll angle, and, thereby, reduce reaction time.

- Visually check to ensure skids/wheels aren't secured to the ground. This is particularly important during winter weather when landing gear may be buried in snow or become frozen to the ground.

- Use cyclic judiciously when landing on, or taking off from, a slope. Cautiously raise collective, adding a small amount of cyclic in the direction of the slope as the downslope skid raises. Be careful not to overdo it. The same technique applies to landing, only in reverse.

CAUTION

Be extremely alert for dynamic rollover if you feel the upslope gear break ground before the downslope gear.

In this case one of two things has probably occurred:

- You used poor pilot technique which placed the aircraft closer to that critical roll angle.

- Something is restricting vertical movement of the downslope gear.

The preceding paragraphs have highlighted hazards of and corrective/preventive action for dynamic rollover phenomenon. If the lessons and techniques described here sound familiar—they should. They reflect basic helicopter airmanship. Unfortunately, most human factors related mishaps occur because someone temporarily *forgot* the basics.

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Ranks and units are those at time of award. See MACR 900-3 for details on how to apply for your own milestone award. ★

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Mishap With A Moral

Do you prevent . . .

Poor Judgment

Preflight planning often finds us scurrying about in many different directions, collecting information: Flightplan, fuel plan, weather, maintenance status, NOTAMS, mission, passenger load, cargo load, restrictions, to name a few. Sometimes it seems the sheer number of things we're supposed to gather, check, and be familiar with is inexhaustable. We employ the crew concept to divide the workload, but it's still demanding. It's almost as if, despite our best efforts, required tasks expand to fill the time available before flight. But the system works as long as we maintain a regular, systematic approach to the process. In time we become good at it and learn to cope effectively, even with the unending variation in this non-exact science of airlift. On the other hand, *in*-flight planning receives far less attention. Usually the inexperienced must "age," developing techniques for themselves. The much discussed process of "keeping ahead of the aircraft" gets woefully little press. Aside from the prompts written into the margins of checklists, guidance is pretty much absent. Because planning in flight is mostly a "common sense' endeavor, it defies the bounds of procedural edict. But *some* attempt to prepare for each successive step of a mission is a part of every aircrew's experience—whether intentional or not. Sometimes, the lack of careful assessment of the need *behind* in-flight planning can lead to a mechanical, non-productive exercise as when we gather information, and then fail to analyze, assimilate, or act on that information. The best possible decision, when based on inadequate or faulty information, can still be wrong. Failure to use data we have

at hand short-circuits our ability to fly safely . . . On 4 February 1985, pilots and passengers of North Pacific Airlines Flight 1802 came face-to-face with the results of poor judgment.

A crisp February morning found the crew of North Pacific Airlines Flight 1802 preparing for their scheduled commuter airline flight from Anchorage to Soldotna, Alaska. Identifying himself only by stating "I am on NPA 1802," a crewmember contacted the preflight weather briefing controller at the Anchorage Flight Service Station (FSS). He requested an Anchorage forecast, the current Kenai, Alaska weather, and "anything" the Anchorage FSS had for Soldotna and Homer, Alaska. The controller briefed him on the existing weather conditions at Kenai and Homer, a terminal forecast for Kenai, and a portion of inflight weather advisory AIRMET Sierra. The AIRMET called for light to moderate rime icing in clouds, precipitation below 9,000 feet, and light to moderate clear icing in light freezing rain. There were several PIREPs reporting light to moderate icing in the Anchorage area. The weather briefing concluded at 1746 Alaska Standard Time (AST).

Nearly an hour later, Flight 1802 contacted Anchorage ATC advising reception of the current ATIS and requesting an IFR clearance to Soldotna. The clearance delivery controller issued an IFR clearance to the NPA crew at 1839 AST, mandating the Anchorage Eight departure and an altitude of 3,000 feet. NPA Flight 1802 acknowledged the clearance and took off 15 seconds later. The crew flew the aircraft south on Victor Airway 438 and were cleared to climb to 4,000 feet. They requested and were granted a change of flight plan to proceed direct to Skila Intersection for the NDB approach to the Soldotna Airport.

Anchorage center terminated radar service and, at 1920 AST, Flight 1802 reported to Kenai FSS they were over Skila commencing the NDB approach to runway 25.

Kenai acknowledged and issued the latest weather for the airport at Kenai. Five minutes later, at 1925, Flight 1802 reported they were at the NDB inbound. Two minutes later they reported a missed approach to Kenai and requested a second approach. Kenai FSS advised the crew contact Anchorage Center for clearance for another approach.

After contacting Anchorage FSS and reestablishing radar contact, they were instructed to climb, heading 360°, to an altitude of 5,000 feet. At 1928 AST, the crew of Flight 1802 replied "Anchorage Center, 1802. Unable five thousand—carrying heavy load of ice." The Anchorage controller acknowledged and cleared Flight 1802 to "climb and maintain 2,000 (feet)." A crewmember of Flight 1802 acknowledged and continued to accept heading instructions from Anchorage center.

At 1949, the controller vectored Flight 1802 to an inbound course to the Kenai VOR. They could fly the second approach to Soldotna from there, this time using the VOR Alpha approach. Just 41 seconds later, Flight 1802 reported to Kenai FSS, "Roger, we are seven point five DME." This was the last transmission between Flight 1802 and any FAA air traffic facility. At 1951 AST, NPA Fight 1802 crashed about 1.5 miles southeast of Soldotna Airport, Soldotna, Alaska, killing all seven passengers and both pilots. The aircraft was destroyed by impact and post impact fires.

ANALYSIS

The National Transportation Safety Board (NTSB) concluded the pilots were properly certificated with no preexisting medical conditions germane to the accident. Turning to the aircraft, they discovered, upon careful analysis, there was no indication of power plant failure and concluded a loss of power didn't cause or contribute to the accident. However, an examination of aircraft records, available to the crew, disclosed no corrective action for the following discrepancies: deice boots on two blades on the left propeller were missing; the "single" or manual operational mode of the antiice system was inoperative, although the "automatic" mode was operational; the autopilot was inoperative; the transponder altitude encoder was inoperative; and the vacuum fail light didn't work. The records also showed the aircraft had a recurrent problem with its deice system and may have only provided partial operation of the deicer boots because of leaks in the pneumatic system.

WEATHER

Before the approach, NPA 1802 was required by company regulation to contact the company weather observer at Soldotna for current weather, including local altimeter setting, before commencing an instrument approach. About 1900, a member of the crew called Soldotna on the company radio frequency and requested winds and weather. The call was answered by a company employee certified to make

weather observations. According to the employee, she provided the following Soldotna weather information to Flight 1802: "Winds calm, ceiling 600 to 800 feet, visibility approximately 8 to 10 miles, no precipitation." After the transmission, a member of the crew stated they were 10 to 15 minutes out. At this time, Flight 1802 was about to level off at 4,000 feet after departing Anchorage.

About 1920, when the crew was poised for their first approach attempt, they called the company weather observer again, requesting winds and altimeter setting. The same employee responding to the first call answered this one. She provided wind information and altimeter setting for Soldotna. She stated there was light ground fog with two to three miles visibility, and there was no definite ceiling. The employee stated she heard Flight 1802 make a low sweep over the airfield, east to west. Shortly thereafter, a crewmember called on the company radio, reporting the ceiling was approximately 600 feet.

Later, at about 1950, while the crew was on the second approach, a crewmember called again and requested weather. This call was answered by a different employee, also certified to make weather observations. He said he told the crew of Flight 1802 that the weather was below minimums, that there was fog all the way to the ground, and to "get the hell out of there." The crew didn't acknowledge the transmission.

Several pilots operating in the Anchorage/Kenai area during that evening reported moderate icing. At least two pilots, who had landed at Kenai between 1845 and 2000 AST, reported a rate of accumulation of ¾ of an inch per five minutes. None of the pilots reported any wind shear or turbulence greater than light turbulence. Between 1845 and 2049, a trace of precipitation was reported at Kenai.

AIRMET Sierra 1, issued by the National Weather Service (NWS) at 1515 AST, was valid until 2100. The AIRMET called for light to occasional moderate clear ice in light freezing rain. The accident site was included in the area covered by the AIRMET.

The NTSB concluded the aircraft did accumulate airframe ice because of the weather conditions in the Anchorage-Soldotna area. They made several weather related findings. Six are paraphrased here:

—Flight 1802 most likely encountered moderate mixed icing.

—The content of the in-flight weather advisory AIRMET Sierra 1 is considered substantially correct.

—Flight 1802 most likely encountered freezing precipitation.

—The rate of ice accretions on the unheated impact areas of the airplane while in and below clouds would have been about .15 inch per minute.

—Ice probably formed aft of those surfaces not protected by the airplane's de-ice equipment.

—The aircraft would have encountered heavy icing while flying in the area at and near Soldotna.

HUMAN FACTORS

The NTSB noted that after Flight 1802 acknowledged its problem with ice, it continued to fly for 23 minutes without reporting any further ice problems. The Board also notes the radar vectors given to Flight 1802 placed the airplane over the Kenai VOR, from which point they *could* have made a precision approach (ILS) to Kenai, but the crew chose instead to continue with the nonprecision VOR Alpha approach to Soldotna.

The radar ground track showed the crew flew directly to the Soldotna Airport. Since there is no runway aligned with the inbound course, they had to circle to land.

The path of the aircraft revealed the crew was not attempting to comply with the missed approach procedures. Because the crew didn't contact Kenai with a missed approach call on this second attempt, but did on the first effort, the board concluded the crew was circling to land. There's a warning on the Soldotna VOR Alpha approach stating that "circling not authorized south of Runway 7-25," because of a "300 foot hill 0.3 NM south of the airport." The position of the accident site, 1.5 miles southeast of the airport, and the direction of the impact flight/ground path of 073° led the Board to believe the flightcrew was circling left, probably while trying to maintain visual reference to the airport to land on Runway 25. During this maneuver, the flightcrew allowed the airplane to descend below the published minimum altitude into the higher terrain. This was probably an attempt to maintain visual contact during the approach. Weather at the accident site was below published minimums for the approach.

The NTSB made 22 findings, the most important of which follow:

1. Anti-ice/de-ice—inadequate.
2. Maintenance—inadequate.
3. Operation with known equipment deficiencies—performed by pilot-in-command (PIC).
4. Weather condition—below approach minimums.
5. Flight into known adverse weather—performed by PIC.
6. Missed approach—initiated by PIC.
7. Flight to alternate—not performed.

PROBABLE CAUSE

The NTSB determined the probable cause of this accident is a combination of: improper in-flight planning/decisions by the pilot-in-command, improper missed approach, and the crew's failure to maintain minimum descent altitude.

APPLICATION TO MAC

This crew had all the information and time needed to arrive at a better solution than the one they acted on. When considering why they did, the factors considered reveal a pattern anyone could easily fall victim to. The crew appeared dead set on completing the mission, an affliction commonly known as "pressing." As a result of this overriding drive, they performed inadequate planning in flight, perhaps not even thinking through, much less discussing, the options available on the approach. This, despite their obvious concern for the weather, was evidenced by their repeated requests for weather updates from varying sources. This accident highlights our point: the worst time to plan your approach is while executing it. ✈

Adapted from: NTSB/AAR-86/01/SUM

To Survive . . .

See and Avoid

by David F. Sale
US Army Safety Center

Today's airways are becoming more and more saturated with both civilian and military aircraft. Between 1973 and 1978, the number of general aviation aircraft increased from 144,000 to 186,000. What is even more unnerving, FAA estimates that by the year 2000, civilian aircraft will approach 375,000, not to mention the increase in military aircraft. As the number of aircraft grows, so do the chances of midair collisions.

In this modern age of aviation, we have highly-sophisticated computerized air traffic control and navigation systems. But despite these elaborate systems, we continue to have inflight collisions.

This is evidenced by the disaster that occurred in San Diego, California, in 1978, and more recently by the Aero Mexico/lightplane midair near Los Angeles. It was 0900 in San Diego when a Boeing 727 was preparing to land. The airplane was at 3,000 feet in VFR conditions when it collided with a Cessna 172. A total of 137 people on board the two aircraft were killed, along with seven others on the ground. The pilots of both aircraft had received a collision alert warning from air traffic controllers, but they failed to see each other.

Shortly after this mishap, the National Transportation Safety Board cited inflight collisions as one of the largest problems facing aviation. It reported that during the previous 22 years, there were 537 inflight collisions with 1,331 fatalities.

The armed services have also been plagued with midairs. Over an 11-year period, the Army had 70 midairs and 241 fatalities. Many of these mishaps could have been avoided had the crewmembers been practicing the "see and avoid" concept. This is evident in the following mishaps.

- A UH-1H pilot was flying at 4,500 feet in daylight VFR conditions. About 22 miles north of an airport, it collided with a civilian airplane. The left wing struck the underside of the Huey, tearing 3 feet of the wing off the airplane. The Huey sustained a broken right chin bubble and severe skin damage to its underside. Fortunately, both aircraft landed safely and there were no injuries.
- An OH-6 was on approach to a heliport when it collided with a UH-1H which was taking off. The main rotor blade of the UH-1H entered the OH-6 cabin, severing the lower section of the cabin and rupturing the fuel cell. The fuel from the OH-6 spilled on the Huey. Both aircraft caught fire, and the OH-6 disintegrated before hitting the ground. The main rotor blades and transmission of the Huey were torn loose before ground impact. All four people aboard the two aircraft were killed.

Human Side of the Midair

The eyes of each crewmember play the most important part in seeing and avoiding an inflight collision. Yet, we must realize there are many factors that negatively affect visual acuity. Pilots have little or no control over some of these anomalies of vision. However, knowing them may help us limit our exposure to them.

Blind Spot. The blind spot is an area devoid of cones and rods where the optic nerves leave the retina. The location of the blind spot for most people is about 30° right of center. With both eyes unobstructed, the blind spot of each eye is compensated by the peripheral vision of the other eye. However, put a windshield center post or other obstruction between the eyes, and the brain cannot fill the void. Under certain conditions, a Boeing 707 would be blocked out at a distance of 1 mile and a Boeing 747 would disappear at a mile and a half.

Space Myopia. Space or "empty field" myopia causes eyes to focus on the nearest object. This condition can be prevalent during hazy and cloudy days where there are no mountains, buildings, etc., to focus on. A helicopter pilot will tend to focus on the rotor tip path plane while a fixed wing pilot will stare at a part of his instrument panel or windshield instead of continuing to scan for other aircraft.

Nearsightedness. A normal eye with 20/20 vision can detect an aircraft with a fuselage diameter of 7 feet from about four and one half miles. If the crewmember is nearsighted (myopic), he will not be able to see the aircraft until it is closer. How close depends on how nearsighted the crewmember is. The more severe the myopia, the closer the aircraft will be before it is detected. If glasses are prescribed for a crewmember, they must be worn.

Glare. Glare overstimulates the eyes and causes a loss of sensitivity. This reduces the ability of the eyes to see objects under normal light conditions. Glare may be produced from light striking the windscreen or the instrument panel at an angle. Blinding glare can be caused by scanning when the crewmember looks directly into the sun, causing a temporary haze over the visual field.

Lack of Relative Motion. Lack of relative motion results in more time needed for eyes to spot another aircraft. If an aircraft is on a head-on collision course, it will appear motionless. Also, if an aircraft is directly overtaking another aircraft, it will also appear motionless. An object that moves across the windscreen will be much more rapidly detected. The pilot must perform some type of evasive maneuver to cause the apparent head-on collision aircraft to move in some direction on his windscreen.

Focusing. The time required for the eyes to change their focus from one object to another (accommodation time) is at least 2.5 seconds, e.g., time it takes to change focus from the instrument panel to outside the aircraft. This time increases with fatigue and age.

Contrast. Contrast of objects is very important for detection. An aircraft that contrasts with its background is much easier to detect than one that blends in with its background, especially during low-light illuminations. Sky conditions, on many occasions, make it much more difficult to detect another aircraft. If there is a lack of contrast, the aircraft must come closer in order to be detected, thus creating the danger of an inflight collision.

Hypoxia. Hypoxia can affect the ability of the eyes to detect distant objects, especially at night. Due to the lack of oxygen in the blood, the eyes suffer a loss of visual acuity and have difficulty in focusing. A smoker must be especially aware of this factor. The smoker's blood is carrying carbon monoxide which displaces some of the oxygen and makes the effect of hypoxia take place sooner.

Turbulence or Vibration. In extreme cases, turbulence or vibration can cause a deterioration in vision. They can also cause fatigue which further degrades the ability of our eyes and our alertness.

Central Vision. At night, the eye's central vision is lost and peripheral vision, which is not as effective as central vision, must be used.

Midair Avoidance Checklist

Effectively avoiding midairs takes more than just proper scanning techniques. You can help avoid a midair by using the following checklist developed by the Aircraft Owners and Pilots Association.

- Check yourself. Make sure you are physically and mentally up to flying. Wear your glasses, if necessary.
- Plan ahead. Study your entire route and en route weather. Know what approaches you can expect at destination. By planning ahead, you'll be able to spend more time scanning for other aircraft instead of studying a chart or approach plate.
- Clean windscreen. Part of your preflight should include checking the windscreen for possible obstructions. That bug you hit yesterday might get his revenge today.
- Obey the rules. Adhere to all local and federal regulations. Maintain your assigned route and altitude. If you can't, get an amended clearance. Study the area you are flying in and the area you are going to. Enter traffic as specified, if flying under VFR. Many a midair has been caused by a pilot entering a traffic pattern incorrectly.
- Brief the crew. Brief the entire crew on proper scanning procedures and how to report other aircraft. When identifying other aircraft, make sure you are talking about the same aircraft. Many near misses and midairs have been caused by a crewmember identifying one aircraft while the pilot was looking at another.
- Avoid crowded airspace. If at all possible, avoid areas of heavy aircraft traffic. If you must enter these areas, be prepared by planning ahead. When navigating VFR, don't cross directly over VORs, but pass slightly to the left or right. Cross over airports at a safe altitude or, if possible, avoid overflying them altogether.
- Know your aircraft. All aircraft have blind spots. Know the aircraft's flight limitations. If the aircraft is a low-wing type, it will be hard to detect traffic during descents.
- Scan. The most important item is to scan all the time. You must scan continuously. Also, remember most midairs occur when one aircraft overtakes another.
- Talk and listen. Use your radio equipment and monitor it continuously. When approaching an airport, make a radio call from a distance far enough away to receive the local traffic situation. If the airport has radar service, take advantage of it. Remember, FSS will give you traffic advisories at uncontrolled airports. Once you have visually detected a radar target, don't forget it; but don't overconcentrate on it either. There may be many more aircraft in the area. *Remember, the primary responsibility for aircraft separation belongs to the pilot during VMC conditions—not the controllers. In other words, see and avoid.* ✯

Adapted from: Flight Crew

Whiteout!

Winter operations demand advance planning.

(Editor's Note—The scope of MAC helicopter activity includes operations in all types of conditions. However, during this time of year, most of us who fly helicopters turn our attention to hazards associated with winter weather. One such hazard is the danger of encountering a reduced or restricted visibility condition just prior to lift-off from or touchdown on a snow covered landing area—a condition commonly known as whiteout. The following article highlights this hazard. Though written about Army aviators, the lessons learned in this story are universal.)

While any number of events can crop up unexpectedly to ruin a pilot's day during winter operations, few can instill a feeling of utter helplessness as that created by a complete whiteout. When a pilot encounters this condition—whether taking off, landing, or taxiing— the end result is usually disorientation and a mishap. The following is a paraphrased version of one pilot's encounter with whiteout during a training exercise.

Too late for prevention.

"It was about 1300 when we got the word our company area was under a simulated air attack and for all elements to take appropriate action. According to company SOP, our platoon was to disperse approximately five to seven kilometers to the north. Our platoon leader had briefed the night before that, on receiving the warning, our flight of three aircraft would immediately start up and depart together, the two Cobras following the OH-58.

The weather update was not available, but the weather had been previously forecast to be better than 500 feet, 1 mile visibility, with decreasing visibility in snow showers.

Shortly after receiving the warning, my pilot and I were in our aircraft, waiting for lead to take off. Although the weather was still fairly good, the visibility had already begun to decrease because of light snowfall.

I waited until the lead aircraft was about 300-400 meters away before lifting off. Fresh, loose snow, approximately 6 to 8 inches deep, covered the ground. I made a normal, altitude-over-airspeed takeoff and followed lead. I momentarily lost sight of lead because of the blowing snow, but then I reacquired him and joined up, staying about 200-300 meters behind lead. I followed him to the north at about 100 feet AGL and 50 to 60 knots. The weather now appeared to be deteriorating rapidly. As we crossed a ridgeline, the snow began getting heavier. At this time, lead said he was going to make a right turn and return to the platoon location. Following lead, we turned south and crossed over an open field that had trees at the southern end and large powerlines to the north.

By now, weather conditions had worsened substantially due to heavy snow showers. I estimated visibility at 200 meters with an obscured ceiling. As we completed the turn, I saw lead disappear from view. I considered executing inadvertent IMC procedures, but I had no idea where the cloud tops were, and I didn't want to climb through icing conditions to find out. Since I still had visual reference with the ground, I decided to land. At this time, the platoon leader in the lead aircraft directed us to pick a spot and land.

I began a right turn to the north toward an open field. I observed what appeared to be the most level spot, which happened to lie in the northern end of the field, and I began my approach. On final, at about five feet skid height and above effective translational lift, I experienced a complete whiteout. My first reaction was to initiate a go-around, but I remembered the powerlines stretched across our path, somewhere ahead of us. Simultaneously, my pilot also informed me of the existing wire hazard. Consequently, I applied aft cyclic and continued my descent.

From this point on, I can only speculate as to what happened as I had no outside reference. As I continued to set the aircraft down, I felt what seemed to be the right skid contacting the ground. The aircraft rolled left and the left skid struck the ground, after which the aircraft again rolled to the right. That was when the main rotor blades struck the ground. The RPM audio activated momentarily and then went out. The aircraft snap rolled to the left and came to rest almost inverted on its upper left side. I exited through a hole that was made in the right forward section of the canopy. The pilot, who was also unhurt, got out of the aircraft. I glanced at my watch. We'd been airborne approximately ten minutes . . . ."

Easily Trapped

This mishap points out the relative ease with which any pilot can be trapped in a whiteout situation. The IP involved was not unfamiliar with winter operations. He was well-qualified, highly experienced, current, and proficient at the time of the mishap. The aircraft was properly maintained and suitable for the mission. Likewise, while weather conditions at the onset of the mission weren't the best, they were adequate according to Army standards.

Once airborne, the procedures followed by the crew in response to the worsening weather conditions were the same any pilot in a similar situation would have followed. The problem arose when the IP had to make a decision to land—a landing he was committed to make *downwind*. This was pointed out in the mishap report, ". . . The IP had to make a downwind landing because the flight he was a part of continued flying in rapidly deteriorating weather until all other options had been ruled out . . . ."

Without complete weather information concerning cloud tops and icing conditions, the IP had to rule out *the* recommended course of action after encountering a whiteout—go around.

What might have prevented this mishap? First and foremost, had the IP made a decision to abort the mission earlier, he wouldn't have been placed in a position where a downwind approach and landing were necessary. Second, if the IP had adequate weather information concerning cloud tops and icing conditions, he would have been able to make an *informed* decision as to whether or not he could have gone around. Even if the weather forecast indicated IMC flight was impossible, this information would have eliminated the go-around option. This, in turn, might have coaxed the IP into terminating the flight earlier. Finally, had the whiteout been the result of rotor wash rather than the sheer intensity of snowfall, it could have been avoided by maintaining *airspeed* above translational lift until touchdown. Because the aircraft was land-

ing downwind, this would result in a faster than normal slide landing.

But snow doesn't have to engulf an aircraft for the pilot to become disoriented due to a loss of visual reference. Its presence alone can do the job when it blankets the ground, hiding visual cues. One pilot found this out the hard way.

Sans Cues, Sans Rotor

This IP was conducting Night Vision Goggle (NVG) training in an AH-1. After arriving in the designated training area, the IP reconnoitered the landing area and then landed the aircraft approximately 400 feet from a line of trees in front of him. Both the IP and his student then donned their goggles.

After performing a before takeoff check, the IP flew the aircraft to a three-foot hover for a final hover check before surrendering the controls to his student. Upon reaching the three-foot hover, the IP questioned whether the training area was suitable for hover training and decided to land the aircraft to remove the NVGs.

At this point, the IP noticed the helicopter had drifted over a small ditch and he moved the aircraft forward toward more level ground. As he did, he noted—by looking at the tree line ahead—the aircraft was drifting left. As he turned his head to the left to try and locate some mid-range visual cues he'd previously identified, he discovered rotor wash had either blown them away, or covered them with snow. When he looked back toward the tree line—his only remaining visual reference—he noted the aircraft was tilted to the left. As he applied right cyclic control and reduced collective pitch to land, the main rotor blades struck the ground. The ensuing crash tore the main rotor system and transmission from the aircraft. The helicopter remained upright and, fortunately, neither pilot sustained injury.

In this instance, blowing snow induced by rotor wash did not impair the pilot's vision. The problem was the white background of the landing area which, when viewed through the NVGs, eliminated visual hover cues. This caused the IP to become disoriented.

Neither of these two mishaps embodies any of the common cause factors normally associated with these kinds of mishaps. Pilot experience and proficiency were present in both instances and there were no violations of regulations or standard procedures. The problem arose when the demands placed on the crews by weather and terrain exceeded their physical abilities.

In a third instance, the pilot was equally qualified, experienced, and proficient in winter operations; but a single erroneous assumption was all it took to produce a mishap.

Overconfidence

During a night training mission, the pilot of an OH-58 landed at a site that was covered with snow. Prior to landing, the pilot had been warned that "blowing snow" conditions existed on the LZ. The landing was uneventful. It wasn't until the pilot repositioned the aircraft to another spot on the LZ that he ran into trouble. After lifting off, the pilot made a right pedal turn and began moving forward. The rotor wash began recirculating loose snow through the rotor system, reducing visibility and causing the pilot to lose ground reference. Next, the aircraft began moving left. The pilot attempted to remove the aircraft from the condition by increasing collective, thereby placing more distance between himself and the ground and, at the same time, allowing the helicopter to fly out of the whiteout condition. Unfortunately, before this action had the desired effect, the left skid dug into the ground and the aircraft rolled left onto its side. Although this pilot was aware of the recirculating snow conditions on the LZ, he still elected to hover his craft at two to five feet at about five knots. These conditions provide a perfect opportunity for whiteout.

Not only was this pilot experienced and proficient, but he'd been routinely operating under recirculating snow conditions for several days before the mishap occurred. During this time, he hadn't experienced any problems. Consequently, he believed he was capable of coping with this kind of environment. By his own admission, he was caught unaware when he inadvertently encountered the whiteout.

Finally, a fourth example reinforces the lessons learned in the previous mishap. Again, the aircraft involved was an OH-58; the training mission was being conducted at night; and the terrain was covered with snow.

No Warning

With two pilots and a crew chief aboard, the OH-58 gently settled into the thick layer of snow that covered the ground. The night landing had been routine. The problems began shortly after the pilot switched on the landing light and lifted the aircraft into a hover before takeoff. Blowing snow created a restriction to visibility that was intensified by the reflection of the light off the snow. The pilot promptly switched off the landing light and regained limited visibility; however, it wasn't enough for him to immediately recognize the aircraft was drifting backwards.

The copilot was the first to recognize the rearward movement and he attempted to warn the pilot. However, due to an intercom malfunction, the pilot didn't hear the warning in time to prevent the tail rotor from striking some trees.

Following the tail rotor strike, the aircraft pivoted over the trees and began to spin to the right. As the pilot rolled the throttle off and applied collective, the aircraft settled into the trees. Fortunately, all occupants escaped injury. Although both the pilot and copilot were experienced and well qualified for the mission, neither were proficient in night operations over snow.

From the few examples cited in this article, you should readily see the potential hazards associated with helicopter flight operations over snow. It should be equally clear that experience and proficiency don't exempt anyone from these types of mishaps. With winter weather upon us, it becomes imperative that unit safety and training programs ensure crewmembers are knowledgeable of the hazards associated with winter operations and, further, make sure crews are capable of safely operating helicopters over snow-covered terrain.

Adapted from: Flightfax

QUICKSTOPPERS

MARCH MISS

The stalwart Norton AFB C-141 crew, going by the name of Slam 09, had just completed a PAR approach at March AFB. They were cleared to 5,000 feet and directed to intercept the 135° course inbound to the Box Springs (BXM) VOR. The crew was also cleared for the VOR approach to Runway 32 at March using ICAO procedures. When four miles outbound, March GCA issued a traffic advisory, "11 o'clock, 2 to 3 miles westbound, altitude unknown." The controller tried to get an altitude by checking his PAR scope but the target had yet to appear. When the target did appear on the scope, it was at 12 o'clock and at the same altitude as the C-141. The controller issued a traffic alert with instructions for Slam 09 to climb immediately. The crew of Slam 09 began an immediate climb while requesting a repeat of the instructions. Just after the controller repeated the alert, the Slam 09 FE saw a glider just below the airplane. He estimated the glider had been at the same altitude and on a collision course.

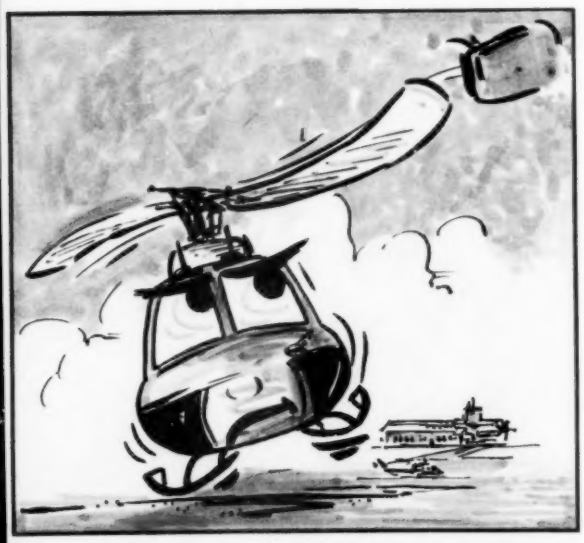
The air traffic problem in the Los Angeles basin is not just near LAX. In this case, the March AFB safety and ATC folks had visited the nearby Hemet-Ryan Airport, the focus of the glider activity, about one month before the near-miss. They discussed March's flying pattern with glider instructors and emphasized the importance of avoiding the March final approach course. Subsequent to this visit, advisories were posted at March Base Ops and broadcasts made over the March ATIS when glider activity was scheduled. Although the glider operations were to be conducted southeast of Hemet-Ryan, March GCA observed numerous targets, assumed to be gliders, throughout the March flying area. This near-miss occurred outside of March's Airport Radar Service Area (ARSA). The controller should get an attaboy for catching this one.

The point of all this? Airspace in the L.A basin is extremely crowded, with no relief in sight. MAC flights in and out of Norton are operating in one of the busiest flying environments in the world. The weather, although usually warm and sunny, can present serious visibility problems due to heavy smog. Get all the information available. Picking up the March ATIS as well as Norton's is one idea. *Watch out!*

HOPPIN' MAD HUEY

The rotors were up to speed,
The crew ready to fly
When the balance weights felt a need,
To say a quick goodbye.

That's what happened to a Huey crew one day as they were preparing to take off. The three-pound balance weights on one blade departed their usual position on the tip and soared some 1,800 to 3,000 feet across the ramp. Of course, the crew was a little too busy to worry about such minor details. They initially felt a sudden, violent movement as the nose of the chopper pitched up 5° to 6°. This movement was accompanied by an explosive sound audible to another crew more than 200 feet away. Uncommanded aircraft movements rapidly progressed into hard pitching and rocking motions that displaced the helicopter more than 5 feet to the right and 2 feet aft. Rotor system movements fed back through the collective controls and bounced both cyclic sticks up and down 3 to 4 inches. The pilot, in the right seat, rolled the throttles back to flight idle when he felt the first aircraft movement. The instructor, in the left seat, assumed control and was able to counter rotor disk movements with opposing inputs long enough to accomplish an emergency shutdown. The villain? Insufficiently tightened balance weight mounting studs. The heroes? Two pilots who kept their cool.

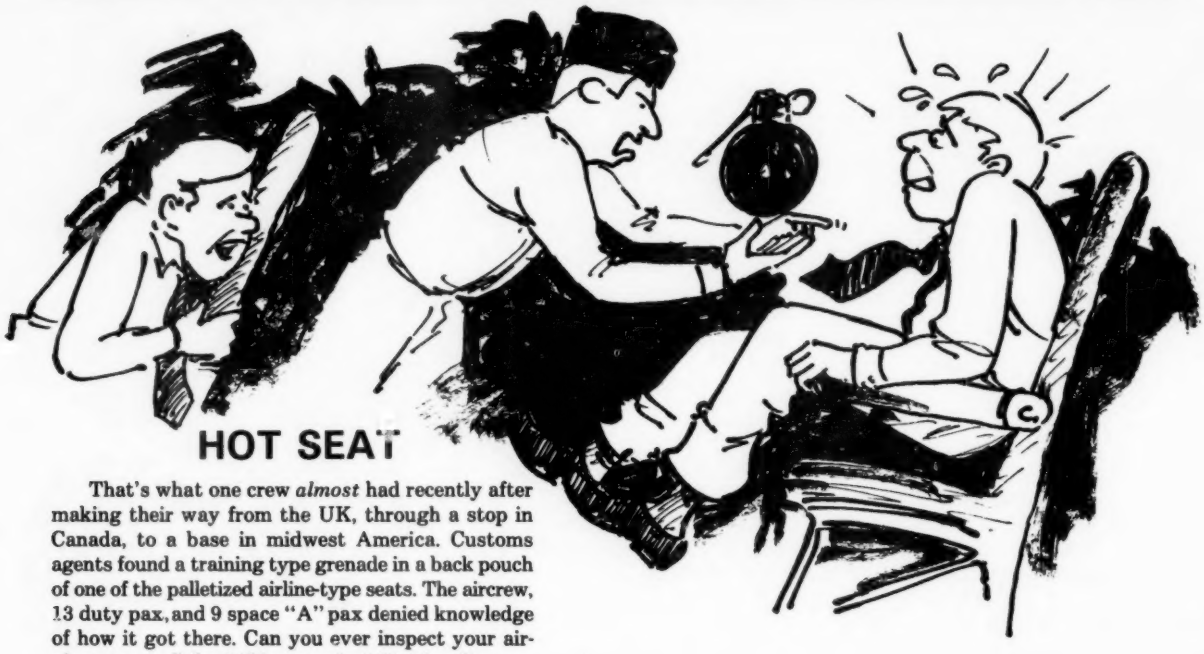


MISCREANT MOONEY

The MAC twin-engine turboprop VIP hauler (commonly called a C-12F) was on a training mission at Dulles International, near our nation's capital. While proceeding inbound to the Martinsburg (MRB) VOR holding pattern, Dulles Approach called traffic at 12-to-1 o'clock, type and altitude unknown. The C-12 pilot called "negative contact" and continued searching inbound. About 5 DME from MRB, the pilot suddenly saw traffic at 1-to-2 o'clock. The traffic was a white aircraft (he thought a Mooney) with red and black stripes that was evidently taking evasive action. Estimated miss distance—200 to 300 feet laterally, *no* altitude separation. The C-12 crew notified Dulles of the near-miss and of their intention to file a near-miss report. The C-12 crew completed the rest of their mission uneventfully. Consultation with Dulles indicated the Mooney was not squawking Mode C (altitude). They also were not able to follow its route on radar.

It looks like see and avoid worked *this* time. The big thing is, you must do the first before you can do the second. When in VMC, keep your eyes peeled, some people have very imaginative interpretations of what constitutes VFR weather.

Quick Stoppers



HOT SEAT

That's what one crew *almost* had recently after making their way from the UK, through a stop in Canada, to a base in midwest America. Customs agents found a training type grenade in a back pouch of one of the palletized airline-type seats. The aircrew, 13 duty pax, and 9 space "A" pax denied knowledge of how it got there. Can you ever inspect your airplane *too* well for hidden nasties? Not hardly.

HOT MEALS

Some meals melt in your mouth, some might even melt on your plate, but having one melt in the oven falls short of a gastronomic event.

That's what's been happening recently with some in-flight meals that come ready to pop in the old (or new) convection oven on your airborne dining car. Seems the plastic plates have a nasty habit of melting or catching fire. From now on, MAC/DEH and DOV recommend you accept meals only on metal trays or fall back to the old standby—the box lunch. Yummmmmmmmmm.

AFTER DEADLINES

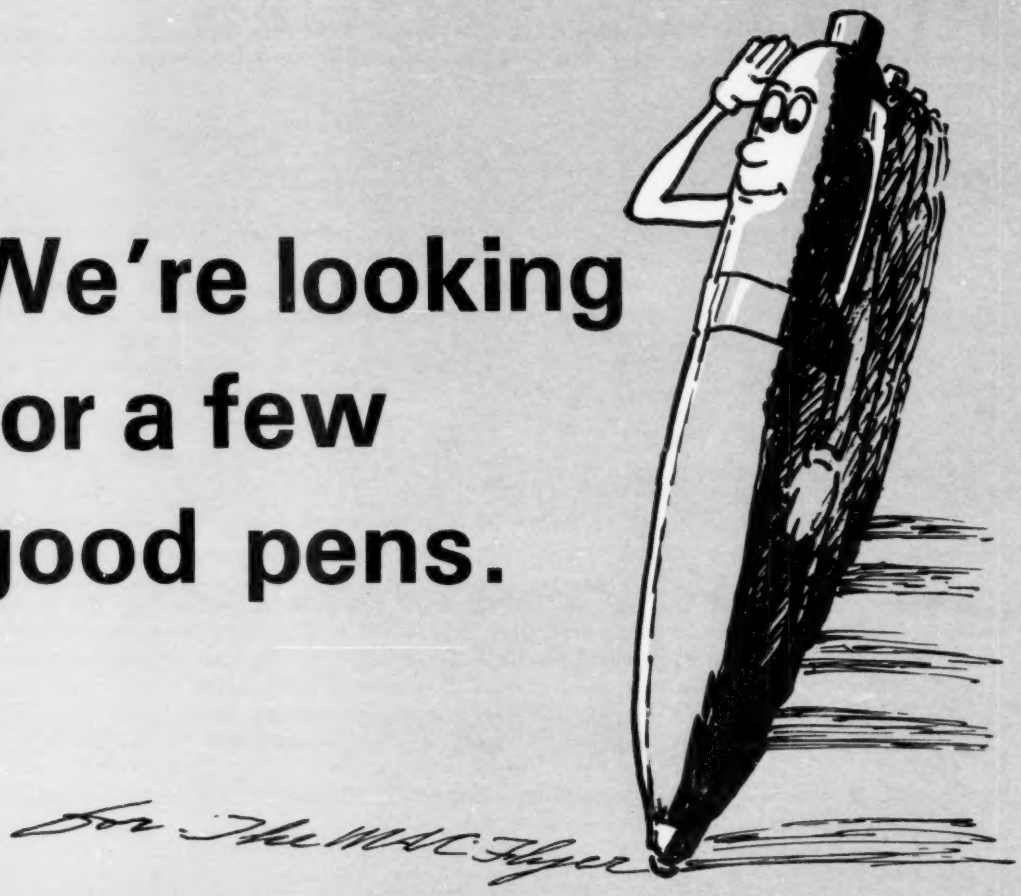
MAC's "MR. SAFETY" RETIRES—Mr. Harold Q. "Hal" Taylor, Chief of Ground Safety at HQ MAC, retired 31 Dec 86, after 26 years of superior service to MAC and the US Air Force. Mr Taylor's safety expertise in industrial operations and aircraft ground handling had a tremendous impact on mission effectiveness and in the reduction of ground mishaps throughout the command. Upon his retirement, Mr Taylor also became one of just a handful of civilians to have his name installed in the Air Force Inspection and Safety Center's Hall of Fame. We at *TMF* salute Hal and his many accomplishments and wish him the best during his golden years.

RESCUE SQUADRON LOGS FIRST SAVE IN HC-130—"We were in the right place at the right time," said Capt. James E. Aslin, HC-130 aircraft commander, referring to three lives credited to the Air Force Reserve's 304th Aerospace Rescue and Recovery Squadron. The saves are the first logged by a 304th HC-130 since the aircraft was acquired by the unit, which is based at Portland International Airport, OR. The crew was notified by Salt Lake Center that an emergency locator transmitter had been activated about 30 east of Boise, Idaho, indicating that an aircraft had crashed. The HC-130, returning to Portland from Scott AFB, was in the immediate area and began a search. They descended to 2,000 feet, and, without a radio operator onboard the loadmaster, Msgt. Russell E. Martin, who was familiar with the on-board tracking equipment, stepped in and aided the pilots and local authorities in pinpointing the wreckage.

OOPS!!—WE GOOFED (KIND OF)—In our December issue, the answer key for the *TMF* Instrument Quiz indicated that the correct answer for question number 2 was "c." AFM 51-37, however, says that "when computing a lead point for speeds below 150 knots, one-half nautical mile turn radius is usually satisfactory for a standard rate turn." Therefore, answer "b" is correct. Likewise, the answer key indicates the correct answer for question number 5 is selection "c." This is true. If, while flying an ILS approach, you achieve full scale deflection of the glide slope, you should only continue descent to Decision Height if the glide slope is recaptured. However, in the mean time, you should descend no lower than localizer minimums. Answer "d" is therefore the real correct answer. The answers were correct but the answer key was in error. We humbly apologize for this blatant display of human fallibility.

☆ US GOVERNMENT PRINTING OFFICE: 1987 754-015/40004

We're looking for a few good pens.



We're looking for the kind of officers who stand out, in a professional sense of course, to fill two vacancies our departing associate editors will create. We need proud, efficient, clever, intelligent, handsome/beautiful, well-spoken, creative, thorough, informed, and enthusiastic individuals who possess superb writing skills. That's right, we're lowering our standards. We know we can't *really* replace the editors we now have. Sometimes though, you just have to move on, and so it is with our current modest authors (who'd undoubtedly be Pulitzer winners except for GPO restrictions), both of whom edited this ad. We'll have positions available in May and July of 1987 for two captains and/or junior majors. Flight safety experience is a plus; a sense of humor is required; modesty is optional. Before concluding you haven't a chance of qualifying, remember: a journalism or public affairs background *isn't* a requirement (though it certainly won't disqualify you). Check through a few issues of *TMF* and you'll see we write just the way we talk (and we're working on improving the way we talk). This could be your big break! If you're even remotely interested (not to imply the kind of tour this is), give Major Weinzierl, Supervising Editor, a call at AV 576-3534/5542.